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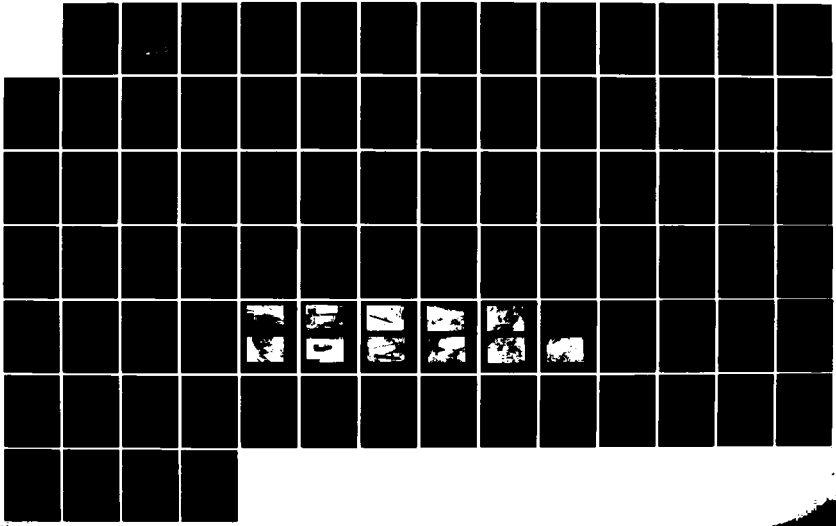

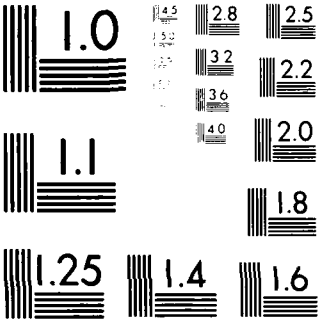

MICROCOPY RESOLUTION TEST CHART

(2)

CONNECTICUT RIVER BASIN
SPRINGFIELD, MASSACHUSETTS

AD-A155 453

MONSANTO COMPANY UPPER DAM
MA 00573

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

OCTOBER 1978

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Springfield, Massachusetts
[illegible] Tributary - Chicopee River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This earthfill embankment dam is about 165 ft. long with a maximum height of [illegible] ft. The project is considered to be in fair condition. The dam is [illegible] size basin; a hazard potential of significant. The owner should [illegible] a qualified engineer to conduct further studies to determine the measures [illegible] to improve discharge capacities.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

JAN 8 [illegible]

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Monsanto Company Upper Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Monsanto Company, 730 Worcester Street, Indian Orchard, Massachusetts 01151.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out [illegible].

[illegible]

[illegible]
[illegible]

MONSANTO COMPANY UPPER DAM
MA 00573

CONNECTICUT RIVER BASIN
SPRINGFIELD, MASSACHUSETTS

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Pages 3 thru 14 are the best available per Mr. Tim Hayes, Army Corps of Engineers, New England District

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.:	MA 00573
Name of Dam:	MONSANTO COMPANY UPPER DAM
Town:	SPRINGFIELD
County:	HAMPDEN
State:	MASSACHUSETTS
Stream:	UNNAMED TRIBUTARY - CHICOPEE RIVER
Date of Inspection:	27 SEPTEMBER 1978

BRIEF ASSESSMENT

Monsanto Company Upper Dam is an earthfill embankment about 145 feet long with a maximum height of about 12 feet. A concrete overflow spillway and chute, 10.5 feet and 9 feet wide respectively, are located on the west abutment of the dam. A 2 feet wide, 4 feet long, 12 feet high brick and concrete intake structure is located at the eastern end of the dam. The full height of the upstream face of the intake structure has provisions for stoplogs. The low level outlet consists of a 20-inch diameter concrete pipe from the intake structure to a manhole located 77.5 feet from the structure; a concrete pipe of 15 inches in diameter and 32 feet in length serves as the outlet from the manhole to the downstream toe of the dam. Discharges from the spillway and low level outlet are into an unnamed brook which flows into the Chicopee River, a tributary of the Connecticut River.

Phase I inspection and evaluation of Monsanto Company Upper Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the earth embankment and the outlet works, the project is considered to be in fair condition. The project has a number of deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for a drainage area of 582 acres, it was necessary to synthesize a test flood hydrograph for the contributing area. Because the dam is classified as small in size,

with a significant hazard potential, the test flood, in accordance with Corps of Engineers guidelines, is one half the Probable Maximum Flood. The Test Flood yields an outflow of 1988 cfs (assuming no discharge from the low level outlet), which is greater than the maximum spillway discharge capacity of 465 cfs and would result in an overtopping of the dam by about two feet. Since the dam will be overtopped by the Test Flood, it is considered that the spillway is inadequate from a hydraulic and hydrologic viewpoint.

Recommendations are made for implementation by the owner within a 12 months of receipt of this Phase I Inspection Report. Among others it is recommended that the owner retain a competent consulting engineer to conduct further studies to determine the measures that are necessary to improve discharge capacities.

In addition, remedial measures are recommended for implementation by the owner within 24 months of receipt of this Phase I Inspection Report to improve overall conditions. These measures, in general, are as follows:

- Programs for observing and monitoring seepage
- Repairs to embankments and appurtenant structures
- Programs for operation, maintenance and inspection

Eugene O'Brien, P.E.
New York No. 29823

This Phase I Inspection Report on **Monsanto Company Upper Dam** has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Richard F. Doherty

RICHARD F. DOHERTY, MEMBER
Water Control Branch
Engineering Division

Joseph A. Mc Elroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVED BY:

Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

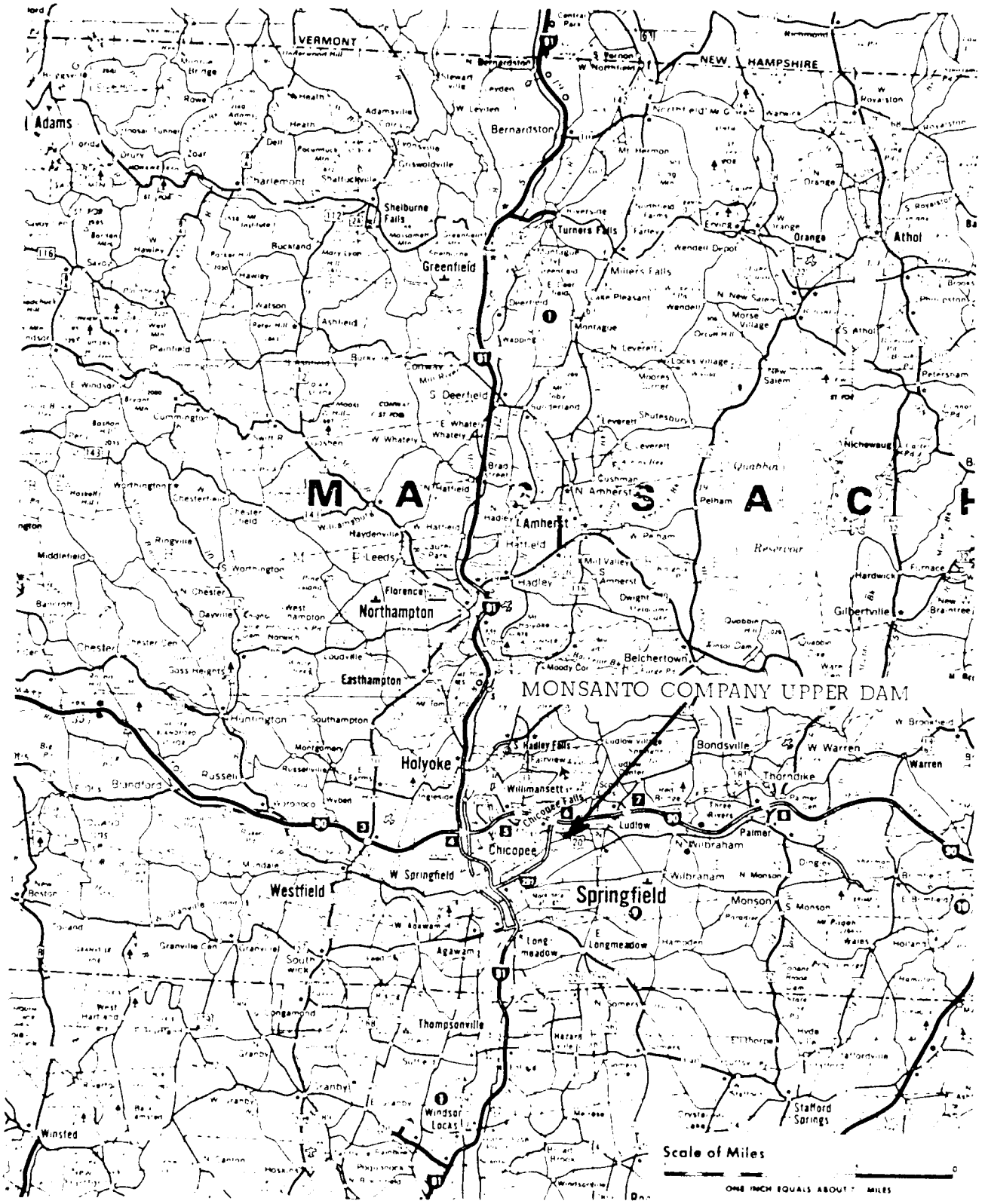
CONNECTICUT RIVER BASIN
MONSANTO COMPANY UPPER DAM
INVENTORY NO. MA 00573
PHASE I INSPECTION REPORT

CONTENTS

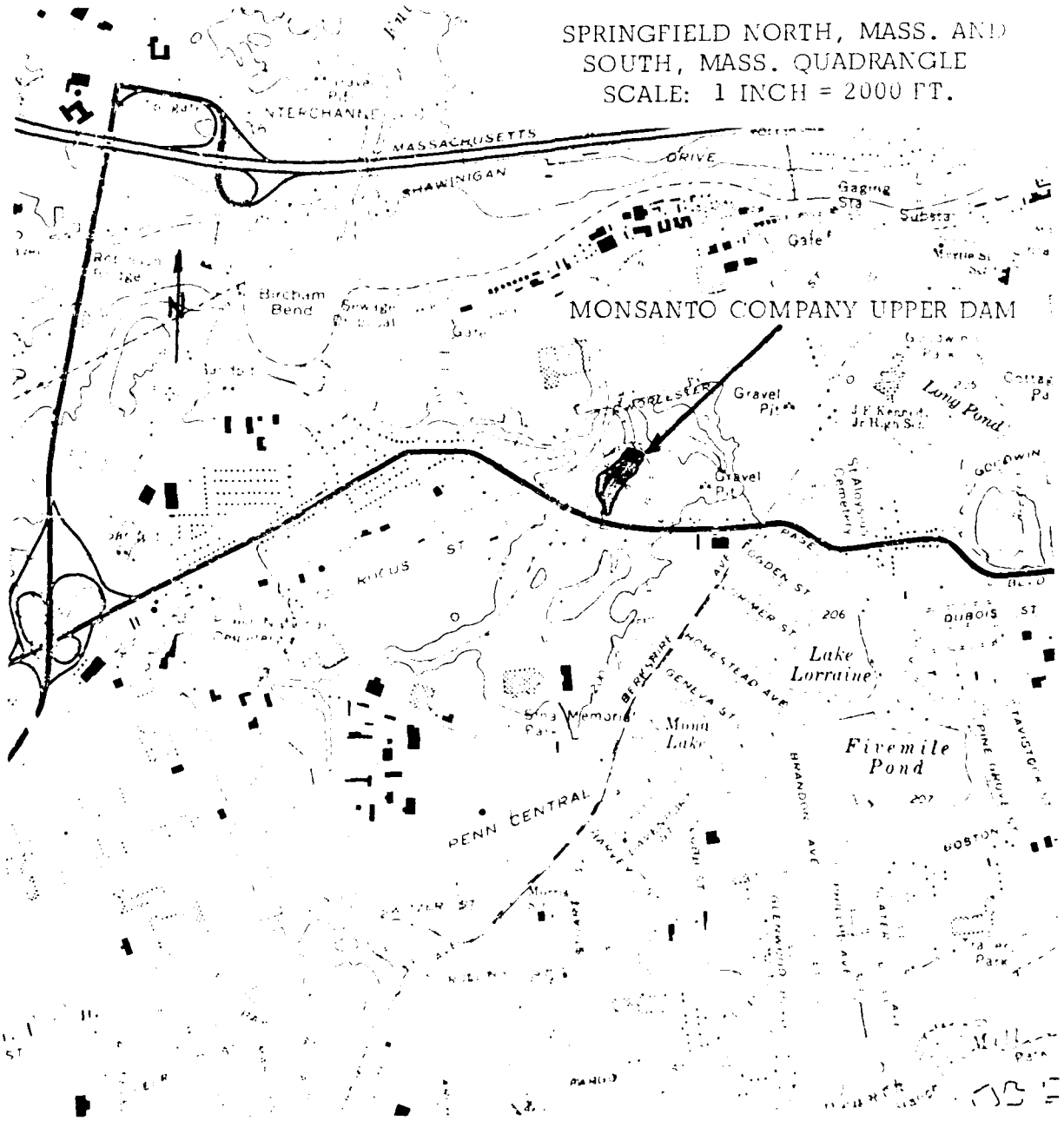
C. PHOTOGRAPHS

D. HYDROLOGIC DATA AND COMPUTATIONS

E. INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS



PLOT PLAN
MONSANTO COMPANY UPPER DAM



TOPOGRAPHIC MAP
MONSANTO COMPANY UPPER DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CONNECTICUT RIVER BASIN
INVENTORY NO. MA00573
MONSANTO COMPANY UPPER DAM
CITY OF SPRINGFIELD
HAMPDEN COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of the dams within the New England Region. Tippetts-Abbett-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbett-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers, Contract No. DACW33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

a. Description of the Dam and Appurtenance.

Monsanto Company Upper Dam is an earthfill embankment. The dam has a crest length of about 1[illegible] feet, a maximum height of about 12 feet and a crest width averaging about 44 feet. The upstream slope varies from about

1V on 3H to 1V on 4H, with about 1V on 3.3H, an average. The downstream slope is about 1V on 2H.

An uncontrolled spillway at the west abutment consists of a concrete-lined channel of a width of 10.5 feet and length of 36 feet. The downstream portion of the spillway consists of a concrete-lined chute of a width of 9 feet and length of 36 feet. The training walls along the channel and chute consist of brick and concrete and are 4.5 feet and 1.25 feet high, respectively. The spillway channel is bridged at the crest by a one foot thick concrete slab of a width of 11 feet and length of 14 feet.

A brick and concrete intake structure, is located at the eastern end of the dam. The inside dimensions of the structure are2 feet by 4 feet: the opening is 12 feet high. The full height of the structure is provided with slots for stoplogs.

The low level outlet through the embankment consists of a concrete pipe 110 feet long. There are two manholes along the length of the pipe, one at 19 feet, the other at 77.5 feet from the intake end. The outlet pipe is 20 inches in diameter to the second manhole and 15 inches in diameter from the manhole to the downstream toe of the dam.

b. Location

The dam is located in Indian Orchard, an eastern suburb within the City of Springfield, south of the Chicopee River, between Worchester Street and Page Boulevard, west of Berkshire Avenue.

c. Ownership

Monsanto Company Upper Dam, formerly known as Upper Fitzgerald Dam, has been owned by the Monsanto Company since about 1957. The previous owner is unknown. The day-to-day operation and maintenance is managed by the Monsanto Company. A minimal amount of maintenance (grass cutting) is carried out by the "Santorians", a private club whose members are employees of the Monsanto Company.

d. Purpose of the Dam

The impoundment provided by the dam is for recreational purposes. A private beach and park located on the property is maintained by Monsanto Company. The beach has not been used for the past five years because the lake is no longer suitable for swimming.

e. Design and Construction History

Original design and construction records are not available. The exact year the dam was built is unknown; however the National Inventory of Dams lists the approximate date of construction as 1900. There are no records of any alterations to the dam. In a past inspection report by the County of Hampden in 1957, reference is made to a "sunken spot" on the downstream slope of the embankment directly over the low level outlet pipe. In the following year the County's Inspection Report states that the "dam has been repaired". (See Appendix). It is reported also that in about 1960 the spillway was repaired. The extent of the repairs is unknown.

f. Normal Operating Procedure

The present normal operating procedure is to keep the lake level about 4.5 feet below the top of the intake structure, about 6.5 feet below top of dam. This is accomplished by adding or removing the necessary number of stoplogs from the intake structure. In the past, when the lake was used for swimming, the level was raised to the spillway crest in the summer and drawn down for the winter. It is reported that the lake was drained last in 1973. Presently no formal schedule of operation is maintained. The caretaker of the park "keeps an eye" on the lake level.

g. Size Classification

The dam is less than 40 feet high and has a storage capacity less than 100 acre-feet, therefore, it is classified as a "small" dam.

h. Hazard Classification

The dam is in a "significant" hazard potential category because analysis indicates that a shallow depth flood wave would result from a dam failure. The wave would cause only some damage to a trailer park (about 150 trailers) and an industrial plant. Loss of life would probably not be a factor.

For details on selection of hazard potential category see Section 5.1.1.

i. Operator

There is no single individual responsible for the day-to-day operation of the dam. In case of emergency the person to contact is:

Shift Supervisor
Monsanto Company
730 Worchester Street
Indian Orchard, Mass.
Phone: (413) 788-6911

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to Monsanto Company Upper Dam is about 582 acres (0.91 square miles), roughly triangular in shape. Of the total area, 6 acres (1%) is occupied by the normal lake level, 230 acres are wooded and the remaining acreage is barren, paved or developed. Two railroad spurs, a boulevard and several streets crossing the drainage area have altered the natural drainage pattern. The highest land level is about 70 feet higher than the normal lake level which is assumed to be 1.5 feet below the spillway crest.

b. Discharge at Damsite

Discharges at the damsite are over the concrete overflow spillway and through a low level outlet.

The spillway channel is 10.5 feet wide, 36 feet long. The spillway chute is 9 feet wide and 36 feet long. The computed maximum discharge, at a head equivalent to the Test Flood pool, El 162.05, is 465 cfs (512 csm) and at a head equivalent to the top of the dam, El 160.0, is 275 cfs (302 csm).

The low level outlet consists of a 20-inch diameter concrete pipe of a length of 77 feet and a 15-inch pipe for the remaining length of 32 feet. The computed maximum discharge from the pipe, with a head equivalent to the assumed normal pool, El 154, is 18 cfs (19.8 csm).

There is no record of the maximum flood at the damsite but there is an indication, as reported in a previous inspection report (See Appendix), that a partial failure of the embankment occurred during a 1955 flood. No details regarding the extend of the failure is available, however, it is reported that repairs were made.

c. Elevation (feet above MSL)

Top of dam	160 ± (as estimated from USGS Quadrangle)
Maximum pool-design surcharge	Unknown
Maximum pool-test flood surcharge	162.05
Full flood control pool	Not Applicable
Recreation pool	153.5 ±
Spillway crest (gated)	Not Applicable
Upstream portal invert diversion tunnel	Not Applicable
Downstream portal invert diversion tunnel	Not Applicable
Streambed at centerline of dam	148 ±
Maximum tailwater	Unknown

d. Reservoir (feet)

Length of maximum pool	1500
Length of recreation pool	870
Length of flood control pool	Not Applicable

e. Storage (acre-feet)

Recreation pool	33.9
Flood control pool	Not Applicable
Design surcharge	Unknown
Test flood surcharge	94.7
Top of dam	96.0

f. Reservoir Surface (acres)

Top of dam	14.7
Test flood pool	17.0
Flood-control pool	Not Applicable
Recreation pool	6.0
Spillway crest	9.2

g. Dam

Type	Earthfill
Length	[illegible] ± feet
Height	[illegible] ± feet
Top width	[illegible]

Side Slopes-Upstream	1V on 3H to 1V on 4H; 1V on 3.3H average
- Downstream	1V on 3H
Zoning	Unknown
Impervious score	Unknown
Cutoff	Unknown
Grout curtain	Unknown
Other	None

h. Diversion and Regulating Tunnel

Type	Not Applicable
Length	Not Applicable
Closure	Not Applicable
Access	Not Applicable
Regulating facilities	Not Applicable

i. Spillway

Type	Culvert
Length of weir	10.5 feet
Crest elevation	155.5 ±
Gates	None
Upstream channel	None
Downstream channel	Concrete chute: 9 feet wide: 36 feet long

j. Regulating Outlets

The regulatory outlets consist of an uncontrolled overflow spillway and a intake structure.

The spillway (El 155.5) consists of a channel which is 10.5 feet wide and 3[illegible] feet long and a chute which is 9 feet wide and 36 feet long. The walls along the spillway and chute are 4.5 feet and 1.25 feet high, respectively.

The opening in the intake is 2 feet wide, 4 feet deep and 1[illegible] feet high. There are slots [illegible] removable teplogs along the full height of the opening. The outlet pipe, whose condition could not be assessed because of unavailability, is 2 [illegible] feet in diameter for the first 77 feet, then it reduces to 1 [illegible] inch diameter for the remaining 32 feet. The lake can be drained using this outlet system.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data and specific memoranda are not available for the original construction of the dam. There are two 1960 drawings which show the details of the spillway and the intake structure. Sketches,plan and section of the dam,are attached to the 1974 inspection report: however, it is to be noted, that the north arrow shown on the plan should be reversed. (See Appendix).

There is no information available on subsurface conditions.

2.2 CONSTRUCTION RECORDS

There are no construction records available.

2.3 OPERATION RECORDS

No records are kept of rainfall, pool level or changes in control levels effected by the stoplogs.

2.4 EVALUATION OF DATA

a. Availability

Existing information was made available by Monsanto Company; Indian Orchard, Mass.; Office of the Hampden County Commissioners, Springfield, Mass.; and Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity

In general, the information obtained from available drawings, past inspection reports and personal interviews is consistent with observations made during the inspection and, therefore, considered reliable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Monsanto Company Upper Dam was made on 27 September 1978. The weather was sunny, temperature between 70° and 80° F. The last rainfall reportedly occurred a week prior to the inspection. At the time of the inspection, the lake level was about 2.5 feet below the spillway crest.

b. Embankment

The earth embankment appears to be in generally fair condition. The horizontal and vertical alignments of the crest are good with only minimal erosion caused by traffic. The crest is covered with only a minimal amount of turf and there are several saplings growing adjacent to the anchor fences which run along the edges of the crest. (See Photograph No.2). In addition, a depression, about 4 feet in diameter and 2.5 feet deep exists adjacent to a manhole at the downstream edge of the crest. (See Photograph No. 10).

The upstream slope does not exhibit any sloughing, erosion or signs of trespassing. The slope has practically no turf covering, however, there is heavy vegetation in the form of shrubs, saplings and several trees. (See Photograph No. 1).

The downstream slope, because of extremely heavy vegetal growth consisting of trees, brush and brambles made accessibility impossible and therefore could only be partially inspected. The toe area which was accessible is vegetated and swampy. (See Photograph Nos. 3,8,9 and 12).

c. Appurtenant Structures

The spillway appears to be generally in good condition. The approach to the spillway apron is covered by sediment, has a few saplings and grass growing. (See Photograph No 4). The approach apron and spillway channel are covered with a bituminous overlay which is in good condition. The concrete floor of the spillway chute is heavily spalled with some minor debris on the floor. An anchor fence spans the entrance to the spillway chute. (See Photograph Nos 6 & 7). The bottom of the fence is 14 inches above the chute floor, but is equipped with a hinged section, which when raised, provides a clear opening of 26 inches. The spillway

training walls appear to be generally in fair condition. The walls are brick at the bottom and concrete block at the top covered with a mortar surfacing. The brick is in good condition, but the concrete is heavily spalled, eroded and cracked, especially on the east wall (see Photograph No. 5). The concrete bridge spanning the spillway is in fair condition. Spalling and erosion of the downstream side of the bridge were observed (see Photograph No. 5).

The intake structure is in generally good condition. Water was flowing into the structure between and around several of the stoplogs. At the inlet to the 20 inch diameter low level pipe there was some debris which appeared to slightly interfer with the outflow. Debris also existed in the manhole nearest the upstream edge of the crest. The condition at the outfall of the low level outlet could not be determined because the area was inaccessible.

d. Abutments

Minor amount of seepage (about 5 gpm) free of fines was observed at two locations in the vicinity of the east abutment-embankment contact (see Photograph No. 11). Observations along the west abutment could not be made because of extremely heavy vegetation.

e. Downstream Channel

The downstream channels of the spillway and low level outlet were totally covered by heavy vegetation and therefore inaccessible. (See Photographs Nos. 8, 9 and 12).

f. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the investigation revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in Section 7.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no operational procedures for the project.

4.2 MAINTENANCE OF DAM

There is no formal maintenance manual for the project. Vegetation is removed when growth encroaches upon the parkgrounds. There is no scheduled program of inspection conducted by the owner, however, there is a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways. Copies of their latest inspection reports, dated February 19, 1976 and January 31, 1974, are given in the Appendix. Prior to this, the County of Hampden conducted inspections, copies of their reports,dated February 5, 1958 and March 13, 1957, are also included in the Appendix.

4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

4.4 WARNING SYSTEMS IN EFFECT

There is no warning system in effect.

4.5 EVALUATION

The maintenance and operating procedures for the dam and appurtenant structures are considered inadequate. Measures to improve these inadequacies are given in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data

No design data are available. The nearest stream gaging station, Chicopee at Indian Orchard, Mass., provides flow records for a much larger drainage area that is not comparable with that of Monsanto Company Upper Lake. Therefore, synthetic hydrologic methods were employed in the analysis. The drainage area, roughly triangular in shape, encompasses 582 acres, 6 of which are occupied by the lake, 230 are wooded and the remaining are barren, paved or developed. Two railroad spurs, a boulevard and several streets crossing the drainage area have altered the natural drainage pattern. The highest land level is about 70 feet higher than the normal pool level, which is taken as 1.5 feet below the spillway crest.

b. Experience Data

A review of the past inspection reports reveals that an indication that a failure of the embankment in the area of the low level outlet pipe seems to have occurred during a 1955 flood. In addition, one of the reports states that the damage to the spillway, has been repaired. No details regarding the extent of these repairs is available but reportedly they were repaired.

c. Visual Inspection

At the time of the inspection, the water level was about El 153.5, about 2.5 feet below the crest of the spillway. The spillway apron was in good condition, but the training walls were heavily spalled in places. The spillway chute exhibited heavy spalling on the floor.

The intake structure appeared to be in good condition. There were stoplogs on the upstream side of the structure to a height about 12 inches above the pool level. Water was leaking between and around some of the stoplogs. There was debris at the bottom of the intake structure and at the bottom of one of the manholes. The condition of the low level outfall could not be observed because of the heavy growth on and in the vicinity of the downstream toe of the dam.

d. Overtopping Potential

Based on field data collected during the inspection, information on [illegible] available topography[1], storage and discharge [illegible] the lake. [illegible]

downstream dam failure hydrograph, the U.S. Corps of Engineers' "Rule of Thumb" guidance was used. The estimate assumes: (a) the reservoir surface is at the top of the dam at the time of the breach, (b) a breach of 40% of the dam length occurs (58 feet) and (c) the channel has an average roughness coefficient (n) of 0.05. It is estimated that at selected sections, 470 and 1260 feet downstream from the dam, the total flood wave height would be 8.1 and 7.7 feet, respectively, corresponding to an initial peak discharge of 4053 cfs and assuming that flow in the channel prior to failure was negligible. During this inspection the existence of a trailer park, not shown on the USGS topographic map[1], was noted at about 500 feet downstream from the railroad overpass near the Monsanto Company plant. Since both the trailer and the Monsanto Company plant are likely to be damaged by flooding of about two to three feet deep, the hazard from a hypothetical breach of the dam is termed significant. On this basis a flood equal to one half of the Probable Maximum Flood (1/2 PMF) was selected as the Test Flood. The 6-hour Probable Maximum Precipitation (PMP) for the Springfield area is 23.5 inches[3]. After application of appropriate rainfall adjustments[4] and losses of 0.2 inches per hour the resulting rainfall excess corresponding to the PMP is 17.6 inches with 6.48 inches in the maximum hour[5]. The surcharge storage of the lake available between the spillway crest and the top of the dam corresponds to 1.28 inches of runoff from the entire watershed. A triangular unit hydrograph[6] was developed to represent unit runoff from the land area. Using this unit hydrograph in connection with the derived rainfall excess, the PMP hydrograph was computed for the land area and was added to the runoff resulting from the PMP over the lake area. The Test Flood hydrograph, based on 50% of the magnitude of the summed hydrograph coordinates results in a peak of 2080 cfs.

The Test Flood was routed assuming that the pool level at the beginning of the storm would be controlled by stoplogs to be 1.5 feet below the spillway crest (El 154.0). Reportedly current and future lake operation practice calls for maintaining the maximum operating pool at this level. The level of the spillway crest (El 155.5) was based on its relation to the crest of the dam (El 160.0) estimated from the USGS topographic map. The discharge capacity of the intake structure which is controlled by that of the low level outlet (15 inch diameter concrete pipe at the outfall) was not considered in the routing. Also, the effects of sewerage and impacts of development on the runoff before reaching the lake were not considered. Using these assumptions the resulting peak outflow is 1998 cfs (of which 465 cfs flows through the spillway) and corresponds to a maximum pool elevation of 162.05 which is 2.05 feet above the crest of the dam. As a part of this analysis it is estimated that 16% of the PMF could be processed without overtopping of the dam. The approach used in this analysis is conservative because a significant percentage of the inflow to the lake would be regulated before entering the lake by the restricting effect of the two pipe culverts under Pine Boulevard, and the ponding behind it. The

effects of overtopping or breaching of the fill which supports Page Boulevard were not investigated.

On the basis of the procedures described above the spillway and storage capacity are not considered adequate from a hydrologic/hydraulic standpoint and the calculated depth of overtopping could result in failure of the dam. However, a more detailed hydraulic/hydrologic analysis which includes features representing the watershed response more realistically would be required before remedial measures related to spillway capacity are undertaken.

References:

[1] USGS Quadrangle Springfield North, Mass. 1972.

[2] "National Program of Inspection of Dams," Department of the Army, Office of the Chief of Engineers. May 1975.

[3] "Rainfall Frequency Atlas of the United States," USWB Technical Paper No. 40.

[4] Engineer Circular EC 1110-2-27, August 1, 1966.

[5] "Manual For Estimation of Probable Maximum Precipitation," World Meteorological Organization WMO - No. 332, 1973.

[6] "Design of Small Dams," U.S. Department of the Interior, Bureau of Reclamation, 1974.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any serious structural problems with embankment, spillway or intake structure. The deficiencies described in Section 3 which require attention and measures to improve the deficiencies are given in Section 7.

b. Design and Construction Data

No design computations or other data pertaining to the structural stability of the dam have been located. On the basis of past performance, visual inspection, as well as engineering judgment, the dam at present appears to be structurally adequate.

c. Operating Records

There are no operating records or reports available. It is reported that,under the present owner,there have been no operational problems, which would affect the stability of the dam.

d. Post-Construction Changes

The exact year the dam was built is unknown. The National Inventory of Dams indicates that the dam was built about 1900. As far as can be determined, no alterations were made to the dam until 1957 when repairs were made to the embankment and low level outlet system. About 1960 modification and restoration were made to the spillway. No records of these repairs are available.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

Phase I investigation of Monsanto Company Upper Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the earth embankment and outlet works, the project appears to be in fair condition. The project, however, does have inadequacies and deficiencies which, if not remedied, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods (PMF) for an area of 582 acres, it was necessary to synthesize a test flood hydrograph for the contributing area.

Since the dam is classified as small in size, with a significant hazard potential, the test flood, in accordance with Corps of Engineers guidelines, is one half the Probable Maximum Flood. A triangular unit hydrograph was developed to represent the unit runoff from the land area. This unit hydrograph in conjunction with a derived rainfall excess, based on a 6-hour PMP, was used to compute the PMF hydrograph over the land area. The PMF for the entire area is developed by adding the land PMF hydrograph to the runoff equivalent to the PMP over the lake area. The Test Flood hydrograph, based on 1/2 PMF, results in a peak inflow of 2080 cfs.

The adequacy of the spillway was tested by routing the Test Flood through the reservoir using a computerized routing technique. The water surface was assumed to be at the normal pool (El 154) at the start of the storm. The peak outflow from the routed flood (1/2 PMF) was 1998 cfs corresponding to a maximum pool elevation of 162.05 or 2.05 feet above the dam crest.

Since the dam is expected to be overtopped with an inflow equal to 1/2 PMF, it is considered that the spillway is not adequate from a hydraulic and hydrologic standpoint.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The recommendations and remedial measures described in subsequent paragraphs should be undertaken by the owner within the next 12 to 24 months after receipt of this Phase I Inspection Report.

d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures appear necessary and are enumerated in the following paragraph.

7.2 RECOMMENDATIONS

It is recommended that the following measures be undertaken by the owner within 12 months after receipt of this Phase I Inspection Report:

1. A competent consulting engineer should be retained to conduct further hydraulic studies to determine measures necessary to improve discharge capacities.

2. An inspection of the downstream slope, the toe area and abutment contacts should be performed after the heavy growth is removed.

3. A monitoring program should be established to determine whether the zone of dampness located in the area of the downstream toe and described in Section 3 is actually caused by seepage. If seepage is the case, a systematic program of observation and monitoring of the changes in the pattern and quantity of the seepage should be initiated. The abutment contacts also should be included in the program. Such observations can be accomplished by the installation of piezometers.

7.3 REMEDIAL MEASURES

a. Alternatives

The results of the additional investigations recommended above may indicate alternatives which will be needed to provide discharge capacity under flood conditions. These alternatives can only be determined after the completion and evaluation of the additional investigations.

b. Operating and Maintenance Procedures

It is recommended that the following measures be undertaken by the owner within the next 24 months.

1. Establish a formal program of operation and maintenance and initiate biennial inspections of the dam.

2. Provide round-the-clock surveillance during periods of unusually heavy precipitation.

3. Develop with local officials a formal system for warning downstream residents in case of emergency.

4. All vegetation on both slopes should be kept in a close cut condition.

5. All brush, shrubs, and young saplings should be removed from both slopes, the crest and the area immediately downstream of the embankment toe. Large conifers, but not deciduous hardwoods, should be removed and the remaining trees should be inventoried and their condition monitored. If a tree dies, the area around the tree should be closely monitored for seepage.

6. Debris, overhanging trees and other obstructions should be removed and hauled away from all downstream channels.

7. The slopes and crest should be planted with grass seed.

8. The spillway channel walls should be repaired.

9. Debris should be removed from the bottom of the intake structure and both manholes.

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Monsanto Company Upper Dam DATE September 27, 1978

TIME 1430

WEATHER Sunny 70°-80°

W.S. ELEV. 153.5± * U.S.

PARTY:

1. Harvey S. Feldman
2. Jyotindra H. Patel
3.
4.
5.
6.
7.
8.
9.
10.

PROJECT FEATURE	INSPECTED BY	REMARKS
1. All project features inspected by party members		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

* Since no information was available regarding elevations, the top of the dam was taken as El. 160 from USGS quadrangle sheet and all other elevations were taken relative to top of dam.

PERIODIC INSPECTION CHECK LIST

PROJECT Monsanto Company Upper Dam DATE 9/27/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

DAM EMBANKMENT

Crest Elevation 160 ± (*See bottom of previous sheet for explanation)

Current Pool Elevation 153.5 ± *

Maximum Impoundment to Date Unknown

Surface Cracks None

Pavement Condition No pavement

Movement or Settlement of Crest None

Lateral Movement None

Vertical Alignment Good (Minor erosion on crest, very little turf)

Horizontal Alignment Good

Condition at Abutment and at Concrete Structures Extremely heavy vegetation, impossible, two locations of seepage (±5gpm) at east abutment embankment contact

Indications of Movement of Structural Items on Slopes None

Trespassing on Slopes None

Sloughing or Erosion of Slopes or Abutments None

Rock Slope Protection - Riprap Failures No riprap protection

Unusual Movement or Cracking at or near Toes None

Unusual Embankment or Downstream Seepage Heavy vegetal growth made it impossible to inspect downstream slope. Toe drain manifold is swampy.

Piping or Boils None

Foundation Drainage Features None

Toe Drains None

Instrumentation System None

Miscellaneous: Extremely heavy growth on downstream slope and toe area. Some growth on upstream slope and crest. There is a depression on the crest adjacent to [illegible]. The depression is about 4 feet in diameter and 2.5 feet deep.

PERIODIC INSPECTION CHECK LIST

PROJECT Monsanto Company Upper Dam DATE 9/27/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE

a. Approach Channel – NONE

Slope Conditions _____

Bottom Conditions _____

Rock Slides or Falls _____

Log Boom _____

Debris _____

Condition of Concrete Lining _____

Drains or Weep Holes _____

b. Intake Structure

Condition of Concrete & Brick: Condition good

Stop Logs and Slots Entire height of U/S side of structure is stop logs. Gap exists to within about 2.5 feet of top of structure. Water leaking through and around some of logs.

PERIODIC INSPECTION CHECK LIST

PROJECT Monongahela Company Upper Dam DATE 9/27/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - TRANSITION AND CONDUIT

General Condition ~~[illegible]~~ 20"ϕ concrete pipe & 15"ϕ corr. pipe; two manholes, one brick other brick & concrete, all generally good condition

Rust or Staining of Concrete Not Observable

Spalling Minor

Erosion or Cavitation None

Cracking Minor

Alignment of Monoliths N/A

Alignment of Joints N/A

Numbering of Monoliths N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Monsanto Company Upper Dam DATE 9/29/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL

General Condition of Concrete _____

Rust or Staining _____

Spalling _____

Erosion or Cavitation _____

Visible Reinforcing _____

Any Seepage or Efflorescence _____

Condition at Joints _____

Drain Holes _____

Channel _____

Loose Rock or Trees Overhanging Channel Heavily overgrown with trees

Condition of Discharge Channel [illegible] heavy vegetation.

PERIODIC INSPECTION CHECK LIST

PROJECT Monsanto Company Upper Dam DATE 9/27/78

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel

General Condition Good

Loose Rock Overhanging Channel None

Trees Overhanging Channel None

Floor of Approach Channel Some silting, few saplings and grass growing

b. Weir and Training Walls

General Condition of Concrete, Brick walls, poor; Floor [illegible] bituminous overlay in good condition

Rust or Staining None

Spalling Heavy with cavities

Any Visible Reinforcing N/A

Any Seepage or Efflorescence None

Drain Holes None

c. Discharge Channel

General Condition of Chute: Floor [illegible] & some [illegible] chutes

Loose Rock Overhanging Channel None

Trees Overhanging Channel Many

Floor of Channel: Extremely heavy vegetal growth

Other Obstructions: _____

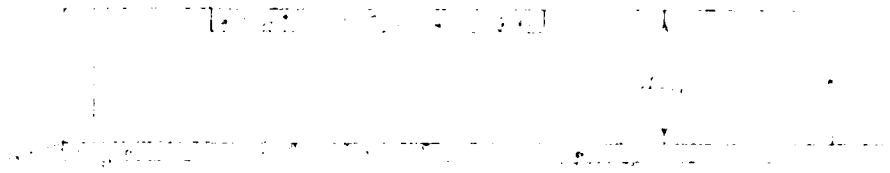
DRAWINGS AND INSPECTION REPORTS

NO.	DATE	DESCRIPTION	BY	APPROVED	DATE

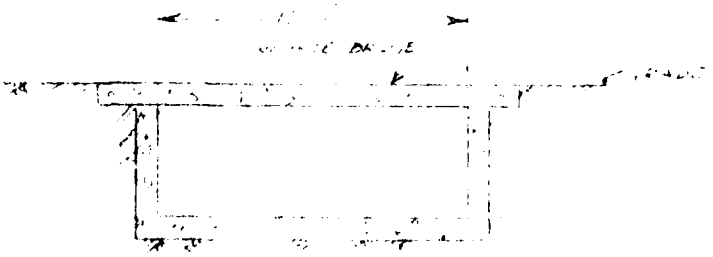
Monsanto Chemical Company

SPRINGFIELD

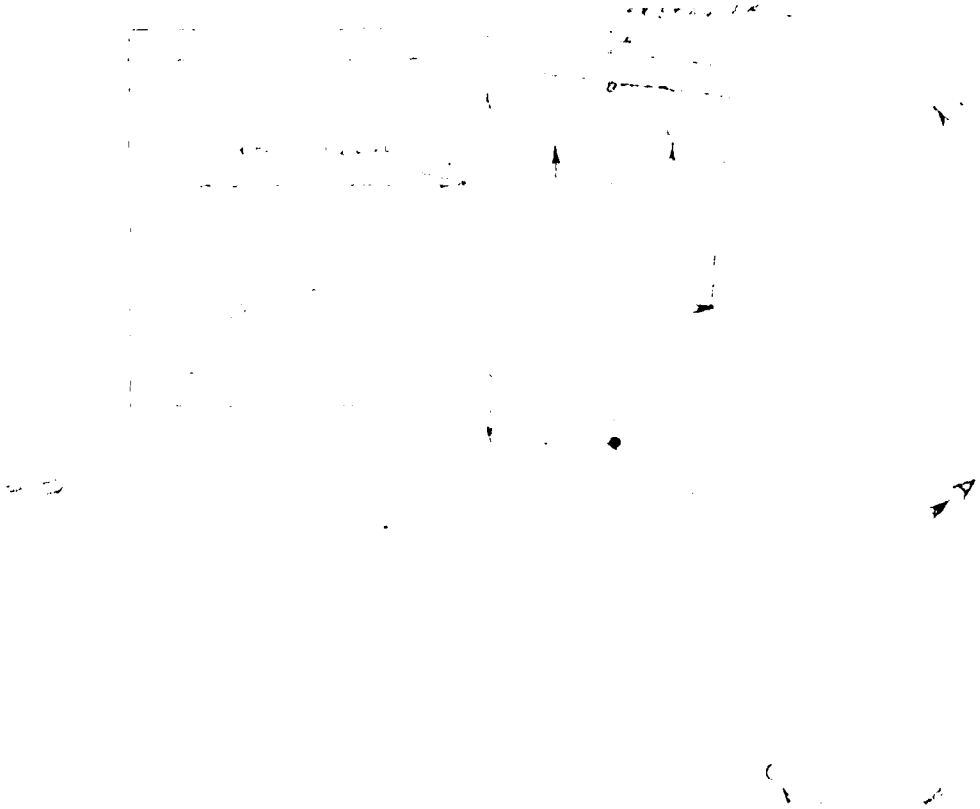
200

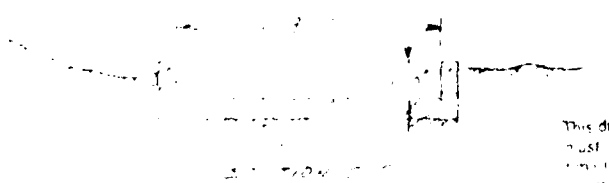


SECTION A-A



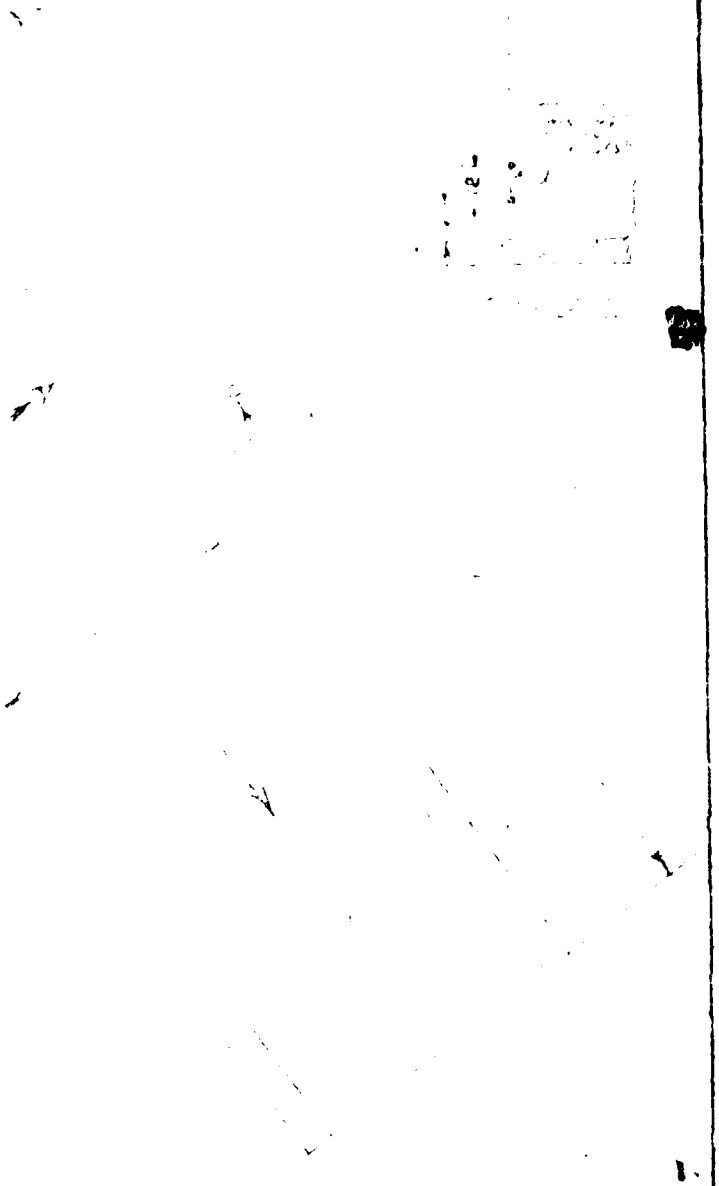
SECTION B-B





MAC A.

SEP 1 1 1978



DESCRIPTION	BY	APPD	DATE

Monsanto Chemical Company
PLASTICS DIVISION SPRINGFIELD MASS

LOCATION SPRINGFIELD
PROJ. NO.
CO. NO.
FILT
SPLASH AT PLASTIC PLANT

	BY	DATE	CHKD	DATE	APPD	DATE
DRAWN						
CHKD						
APPD	FJR 1/27/61					

SCALE 1"=1'-0"
DWG. NO. C3-

MMC
SEP 11 1978

INSPECTION REPORT - DAMS AND RESERVOIRS

(1.) LOCATION:

City/~~Town~~ Springfield. County Hampden. Dam No. 2-7-291-7.

Name of Dam Monsanto Chemical Company "Upper Dam".

Topo Sheet No. 12 B. Mass. Rect. Coordinates: N 421,400, E 422,400.

Inspected by: Harold T. Shumway, On Feb. 19, 1975. Date Last Inspection 1-31-74.

(2.) OWNER/S: As of Feb. 19, 1975

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X.

1. Monsanto Chemical Co., 730 Worcester St., Indian Orchard, Mass.
   Name | St. & No. | City/Town | State | Tel. No.

2. ____
   Name | St. & No. | City/Town | State | Tel. No.

3. ____
   Name | St. & No. | City/Town | State | Tel. No.

(3.) CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Plant Maintenance Supt.
Chester Stretta, Monsanto Chemical Co., 730 Worcester St., Indian Orchard, Mass.
Name | St. & No. | City/Town | State | Tel. No.

(4.) DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where None located.

(5.) DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor____.
2. Moderate____.
3. Severe X.
4. Disastrous____.

Comments: 21 million ±, railroad impoundment - large trailer park downstream.

*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Easterly end of dam - side chute overflow spillway 4'H. x on bottom - 10'L. on top - sidewalls conc. and brick masonr

Controls None, TYPE: _____.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: Minor spalling of concrete sidewalls - Bottom of chute down slope has stone and concrete paving in poor condition.

No. 2 Location and Type: Westerly end of dam - 8'W. x 12'H. x 4'L. masonry drop inlet 20" dia. pipe outlet reduced to 15" dia. pipe on outlet

Controls Yes, Type: Stop logs on front or pond side of D.I. - in place to within 2" of top of D.I. at time of inspection.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: Seepage through stop logs was noted and two large boils were evident at base of stop logs - pressure leak?

No. 3 Location and Type: _____.

Controls ____, Type: _____.

Automatic ____. Manual ____. Operative Yes ____, No ____.

Comments: _____.

Drawdown present Yes X, No ____. Operative Yes X, No ____.

Comments: See Item No. 8 above - removal of stop logs drains pond.

7. DAM UPSTREAM FACE: Slope 4:1, Depth Water at Dam 11' ±.

Material: Turf X. ~~Brush~~ Trees X. Rock fill ____. Masonry ____. Wood ____.

Other Concrete and brick masonry spillway - conc. and brick D.I.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Upper portion of slope and top of dam could have a better developed turf cover. - scattered shade trees.

8. DAM DOWNSTREAM FACE: Slope 2:1.

Material: Turf X. Brush & Trees X. Rock Fill ____. Masonry ____. Wood ____.

Other Concrete and stone paved chute spillway on downstream slope.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Grade of downstream slope very irregular - covered with brushes, light trees, and scattered large trees. Seepage noted along toe of slope.

(9.) EMERGENCY SPILLWAY: Available X. Needed _____.

Height Above Normal Water 1½ Ft.

Width 9 Ft. Height 4 Ft. Material Conc. & brick masonry.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Minor spalling of concrete on sidewalls - bottom of chute on downstream slope badly spalled.

(10.) WATER LEVEL AT TIME OF INSPECTION: 1 Ft. Above _____. Below X.

Top Dam X P.L. Principal Spillway _____.

Other 1/3' above invert of side chute spillway.

Normal Freeboard 3 to 4 Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes - scattered large trees on both slopes - h[illegible] bramble growth, light brush on downstream slope.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam Yes - grade of downstream slope very irregular, poor t[illegible] cover over entire embankment - sandy subsoil material [illegible] fairly erodible.

Cracked or Damaged Masonry Yes - minor spalling of concrete - severe spalling of downst[illegible] end of side chute spillway floor and sidewalls.

Evidence of Seepage Yes - several areas of reddish oxide stained flows were noted a[illegible] toe of slope - est. 20 area swampy at toe of dam.

Evidence of Piping None found.

Leaks Yes - see Item 6 - sub. 2.

Erosion Yes - grade of downstream slope irregular from erosion due to lack of proper t[illegible] cover.

Trash and/or Debris Impeding Flow Yes - minor trash & debris noted in bottom of D.I.

Clogged or Blocked Spillway See above - trash partially clogging outlet pipe from [illegible] - downstream end of outlet pipe half full of silt - channel badly silted in.

Other _____.

DAM NO. 2-7-281-7

(12.) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed_____.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____.

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Mr. Vincent [illegible], a maintenance department supervisory employee of Monsanto Chemical Co., was present during this inspection and all problems and conditions noted in this report were discussed with him. The embankment material appears to be of a sandy type soil and the turf cover is poor on the slopes and practically non-existent on the top of dam. A better developed turf cover on the embankment would seem advisable to prevent erosion. Several large shade trees were noted growing on all sides of embankment but due to large expanse of top of dam they do not appear to create a serious threat to safety of dam. A heavy growth of brambles and small brush was noted on the downstream slope which should be cleared and the slope regraded and a good turf cover established. Evidence of seepage was noted along toe of slope but due to the thick brambles and brush cover a close inspection of this problem was very difficult. The entire area at toe of dam appears to be quite swampy and heavily brushed. The brook channel downstream is badly silted in and the 4' end section of the concrete 15" diameter conduit pipe is dislodged, leaving approximately a 6" gap between the upstream end of the 4' length and the next section of pipe buried under the toe of slope. This condition should be corrected to prevent erosion of the toe of slope and to allow the water to flow more freely from outlet conduit. This pipe is the outlet for drop inlet drawdown structure in pond.

At the drop inlet structure a large boiling condition was noted at the bottom of structure. The cause of this boil appears to be a pressure leak at base of drop inlet structure. Whether this leak is occurring through a broken tree log or whether it is a condition that could be undermining the drop inlet structure itself was impossible to determine.

(9.) EMERGENCY SPILLWAY: Available X. Needed _____.

Height Above Normal Water 1/2 Ft.

Width 9 Ft. Height 4 Ft. Material Conc. & brick masonry.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Minor spalling of concrete on sidewalls - Portion of chute on downstream slope badly spalled.

(10.) WATER LEVEL AT TIME OF INSPECTION: X Ft. Above _____. Below X.

Top Dam X F.L. Principal Spillway _____.

Other 1/3' above invert of side chute spillway.

Normal Freeboard 3 to 4 Ft.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes - scattered large trees on both slopes - heavy bramble growth, light brush on downstream slope.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam Yes - grade of downstream slope very irregular, poor turf cover over entire embankment - sandy subsoil material wo[illegible] easily erode.

Cracked or Damaged Masonry Yes - minor spalling of concrete - severe spalling of downstre[illegible] end of chute spillway floor and sidewalls.

Evidence of Seepage Yes - several areas of reddish oxide [illegible] flows were noted along toe of slope - entire area swampy at toe of dam.

Evidence of Piping None found.

Leaks Yes - see item [illegible] - sub. 2.

Erosion Yes - grade of downstream slope irregular from erosion due to lack of proper turf cover.

Trash and/or Debris Impeding Flow Yes - minor trash & debris noted in bottom of P.I.

Clogged or Blocked Spillway See above - trash partially blocking outlet [illegible] from [illegible] - downstream end of outlet pipe and [illegible] of silt - channel badly silted in.

Other _____.

REMARKS AND RECOMMENDATIONS: (Cont'd.)

It was suggested to Mr. Gregory during the inspection that it appeared advisable to drain the pond and investigate and correct this condition as soon as reasonably possible. The District urgently recommends that your office request the owners to immediately investigate and correct this ceiling condition to avert a possible undermining and collapse of the drop inlet structure.

It was noted at this inspection that all stop logs were in place in the drop inlet and the water elevation of the pond was up to the level of overflowing the side chute spillway crest to a depth of [illegible] inches. This appears to have been the approximate water level of pond all through the winter season. The side chute spillway has a few minor spalled areas on the upstream end and severe spalling has occurred on the downstream end of spillway. These areas should be repaired to prevent further deterioration.

Due to cold weather icing conditions at time of inspection it was impossible to check [illegible] located along the drop inlet conduit line. These were checked on last inspection of January 31, 1974 and the rubbish in them noted at that time has been removed per Mr. Gregory.

[illegible] channel below the outlet of the drawdown which was recommended [illegible] office dated February 25, 1974, has not been accomplished. [illegible] question of ownership of land in this area.

[illegible] appears to be basically sound, the District rates this dam as safe, [illegible] but again notes that owners should give immediate attention [illegible] correcting existing problems at drop inlet, as well as making [illegible] on dam.

[illegible]/vk

DESCRIPTION OF DAM

DISTRICT 2.

Submitted by R. C. Salls, P.E. Dam No. 2-7-281-7

Date January 31, 1974 City/~~Town~~ Springfield

Name of Dam Monsanto Chemical Company "Upper Dam"

1. Location: Topo Sheet No. 12B Mass. Rect. Coordinates N 421,400 E 322,400

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

About 1200' Northerly of Page Blvd. "Route 20" about 2500' Westerly from Berkshire Avenue.

2. Year built UNK Year/s of subsequent repairs UNK

3. Purpose of Dam: Water Supply _____ Recreational _____

Flood Control _____ Irrigation _____ Other _____

Used by employees club.

4. Drainage Area 1.08 sq. mi. ? acres.

Type: Comm. Pub. & Ind. 50 Dense Res. 30 Suburban _____ Rural, Farm _____

& Scrub Land 20 Slope: Steep _____ Med. X Slight _____

5. Normal Impoundment Area: 8 Acres; Ave. Depth 7 to 8'

Impoundment: 20.8 mgals.; 64 acre ft.

Silted: Yes _____ No X Approx. Amount storage area _____

6. No [illegible] Railroad located adjacent to pool or reservoir _____

i.e. summer resorts, etc. None - Picnic Pavilion

7. Dimensions: Length 130± Max. Height 12'±

Freeboard 3-4' when water impounded

Slopes: Upstream [illegible] 4:1 - 1:1 Vertical Wall Inlet

Downstream Slope 2:1

Width at crest: 30' Minimum

Dam No. 2-7-281-7

8.

Classification of Dam by Material:

Earth Embankment ___X___ Conc. Masonry _____ Stone Masonry _____

Timber _____ Rockfill _____ Other _____

8a.

Dam Type: Gravity ___X___ Straight _____ Curved, Arched _____ Other _____

Overflow _____ Non-overflow ___X___

9.

A. Description of present land usage downstream of dam:

20 % rural, 80 % urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes ___X___ No _____

Flood plain has been developed

C. Character downstream valley within _____ Yes ___X___ Developed ___X___

Rural 20% Urban 80%

10.

Risk to life and property in event of complete failure.

No. of people 25

No. of homes Trailer Homes

No. of business 1 Trailer Park

No. of industries 1 Type: Monsanto Chemical Company Plants

Sewer Mains - Water, Gas

No. of utilities all Type Electrical & Telephone Services

Railroads Branch NY Central RR.

Other dams Monsanto Lower Dam #2-7-281-8 Breached

Rte. [illegible] - Worchester St. crosses over brook.

Other There is a Sewage Disposal Plant on Chicopee River about 1000' upstream of mouth of brook.

11.

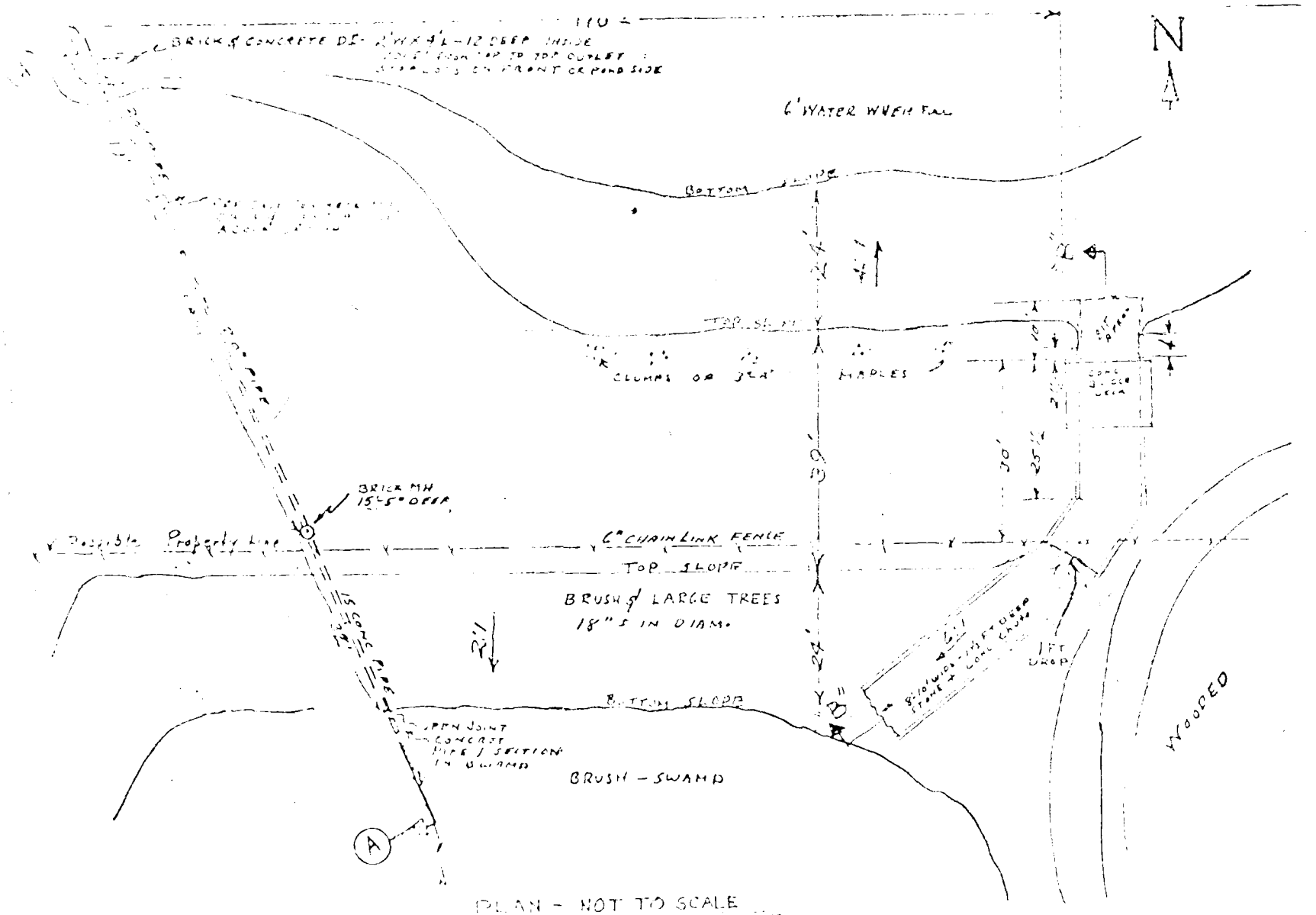
Attach photo of dam to this form showing section and plan on 8½" x 11" sheet.

[illegible]/vk/rt

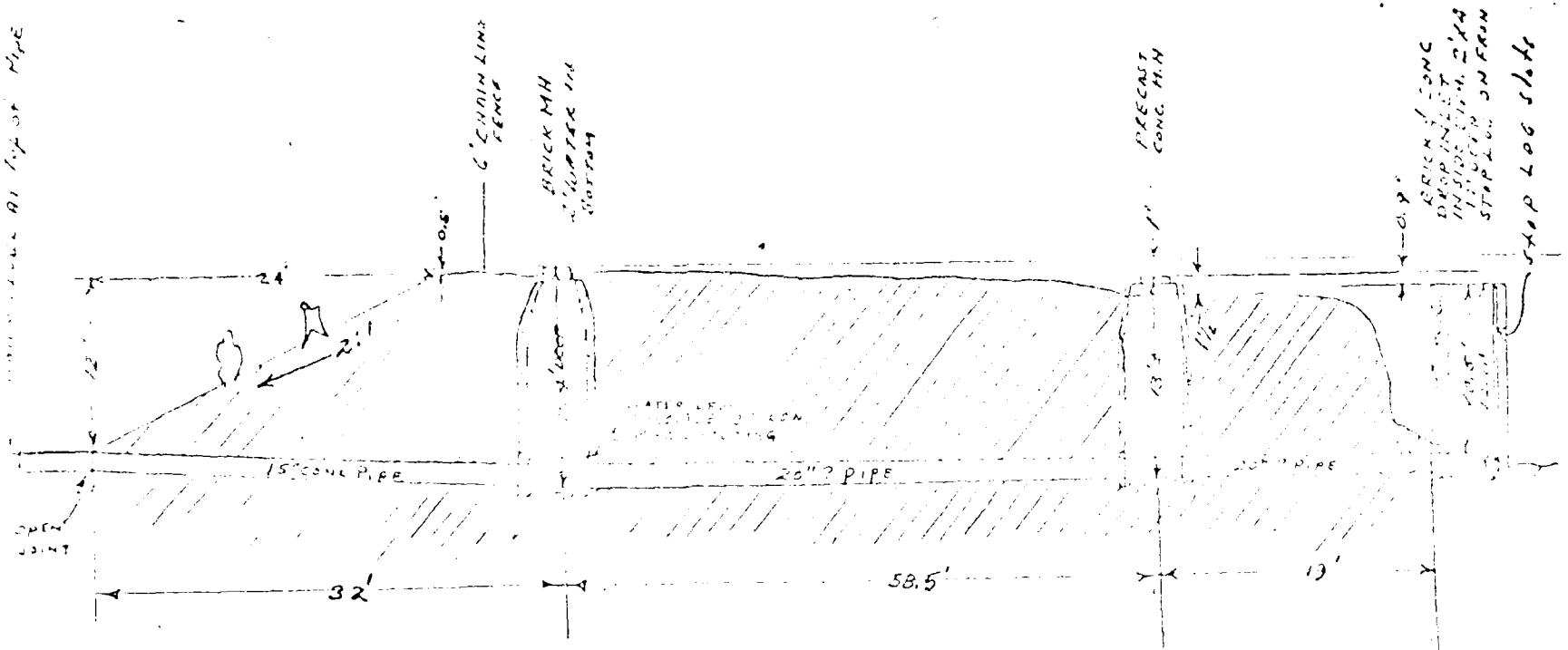
Attachments:

Locus Plan

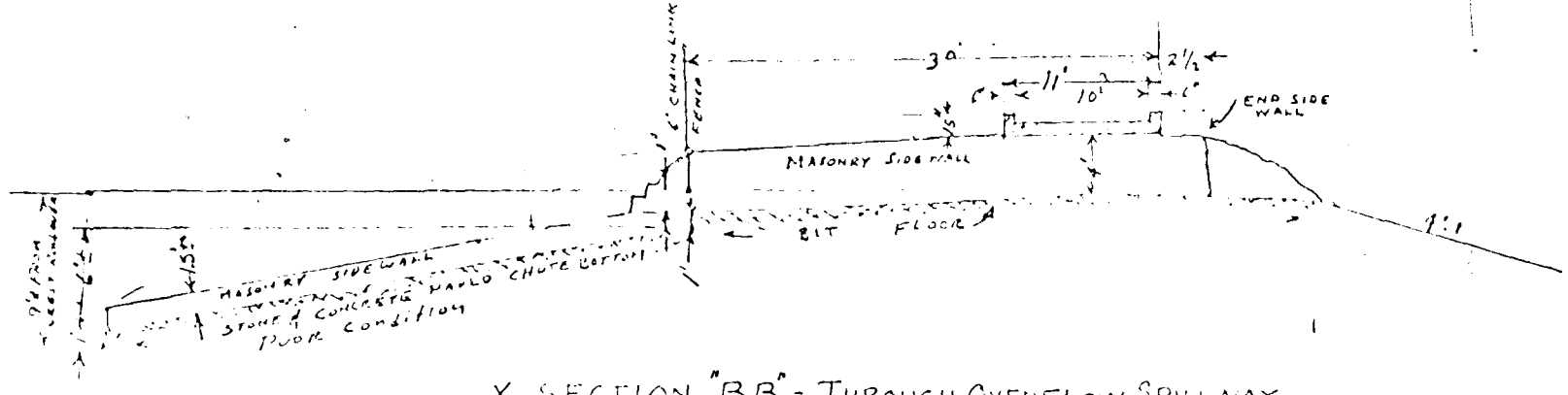
Photos



DAM NO. 2-7-281-7
MONSANTO CHEMICAL CO. UPPER DAM

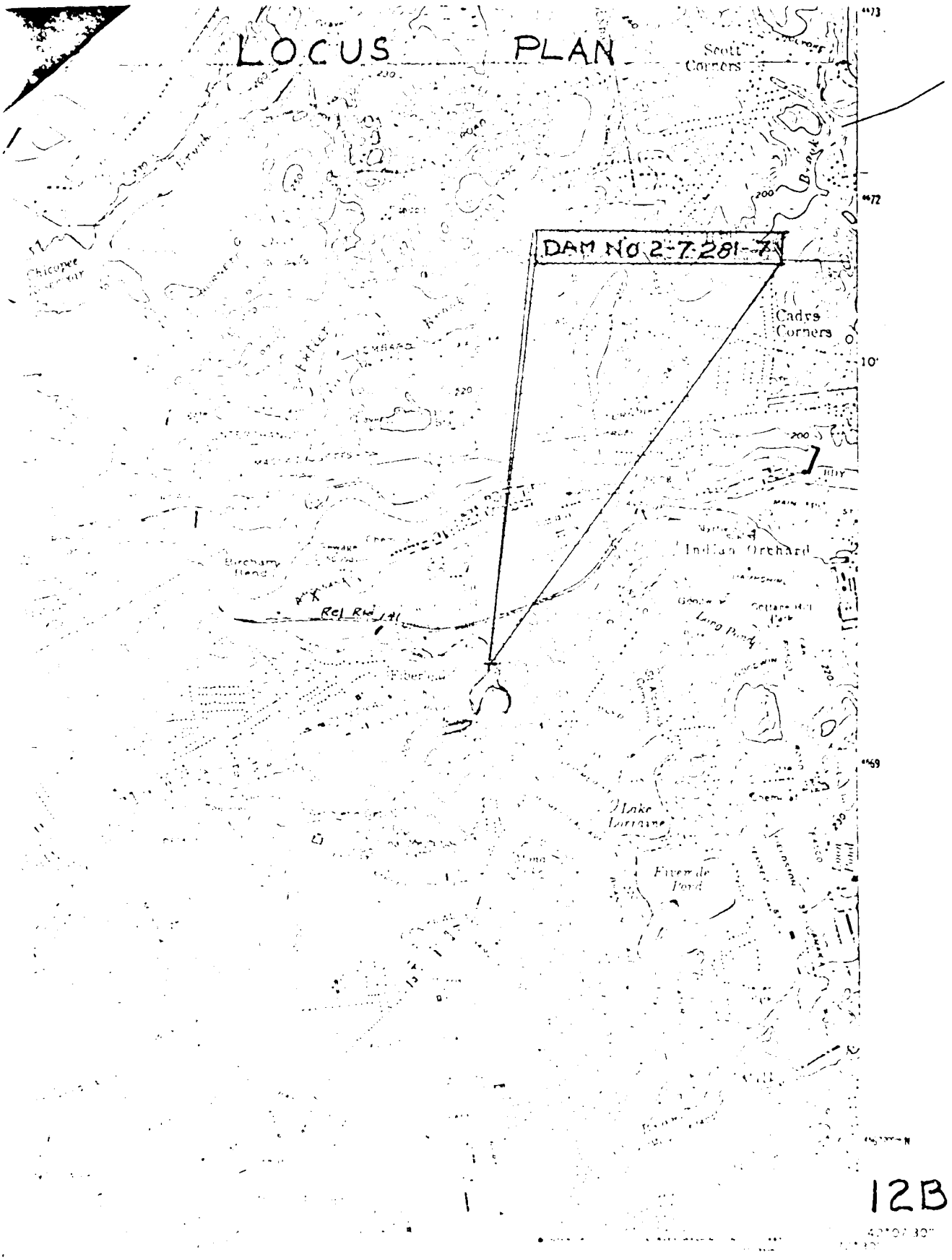


X SECTION "AA" THROUGH DRAW DOWN PIPE



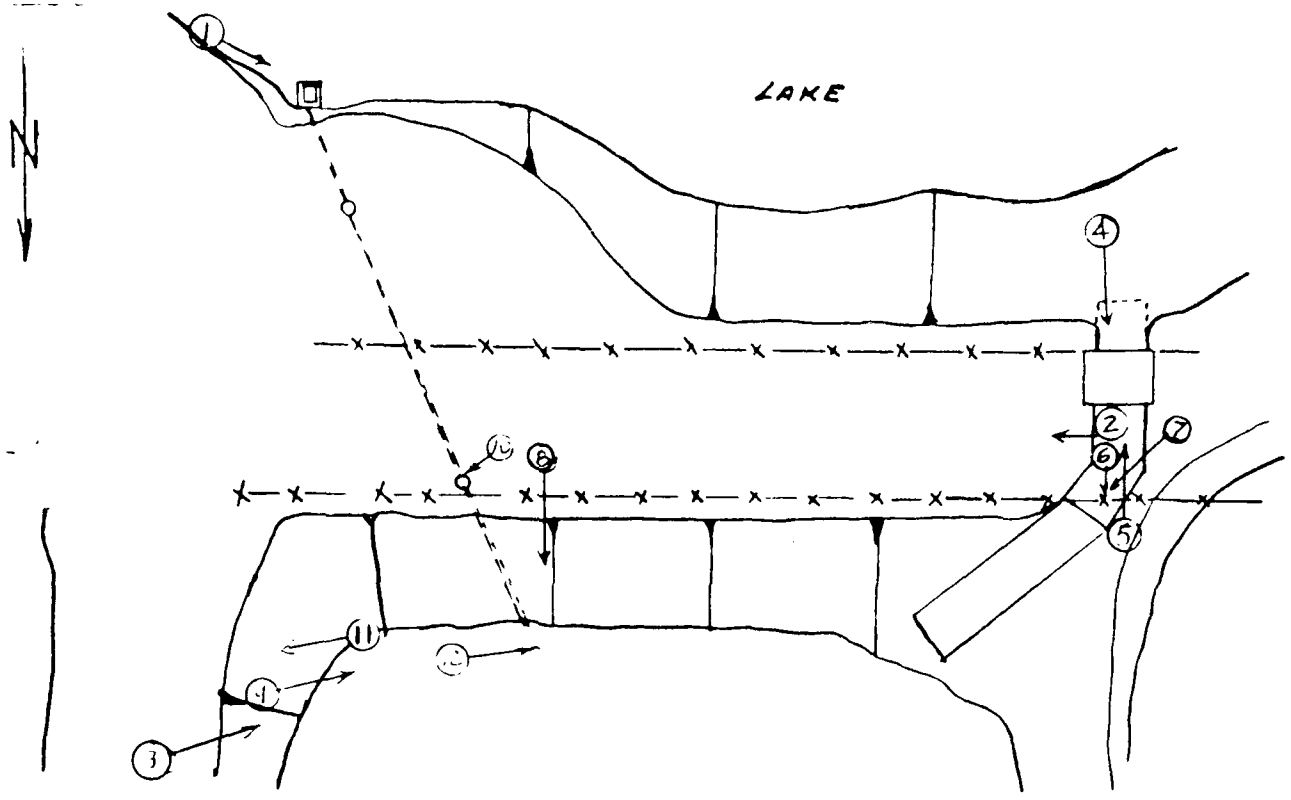
X SECTION "BB" - THROUGH OVERFLOW SPILLWAY

DAM NO 2-7-281-7


LOCUS PLAN
DAM No 2-7-281-7
Scott Corners
Cadrs Corners
Indian Orchard
Lake Lorraine
Fivemile Pond
Long Pond
Birchamp Hill
RCL RW 141
Chicopee
Brook
10'

12B

PHOTOGRAPHS



TAMS BROOKLINE MASS		US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

MONSANTO COMPANY UPPER DAM

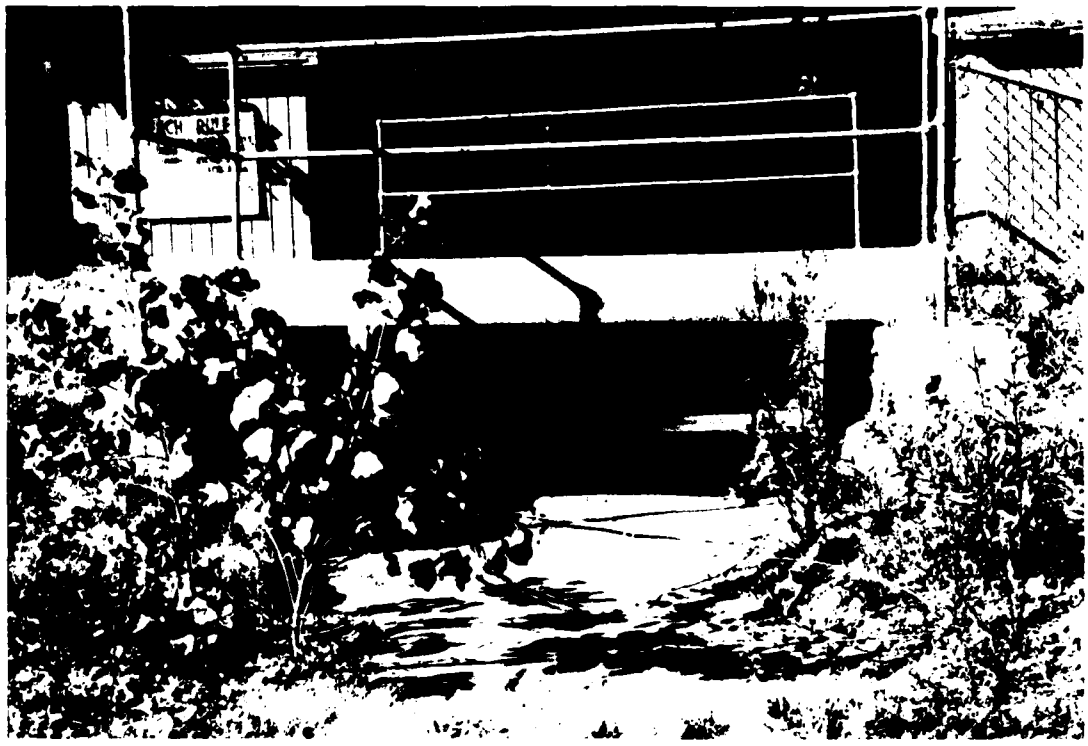
PHOTOGRAPH LOCATION GUIDE

CONNECTICUT RIVER MASS

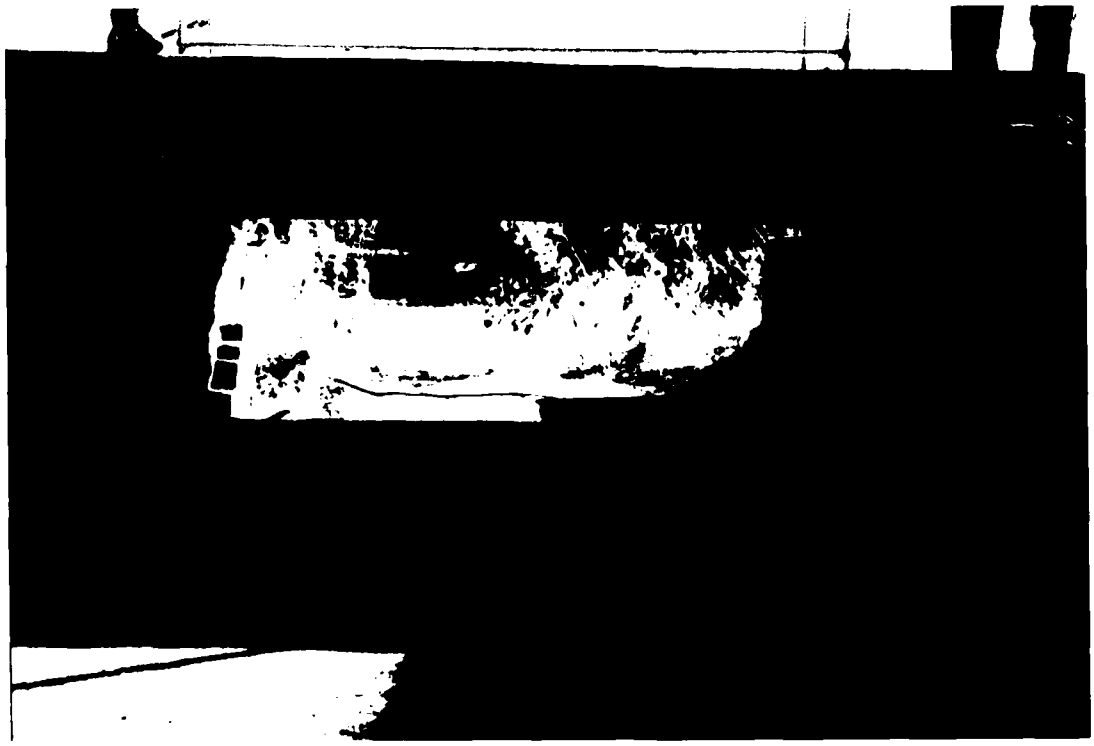
SCALE: NTS

[illegible] EAST. NOTE ABSENCE OF TURF.

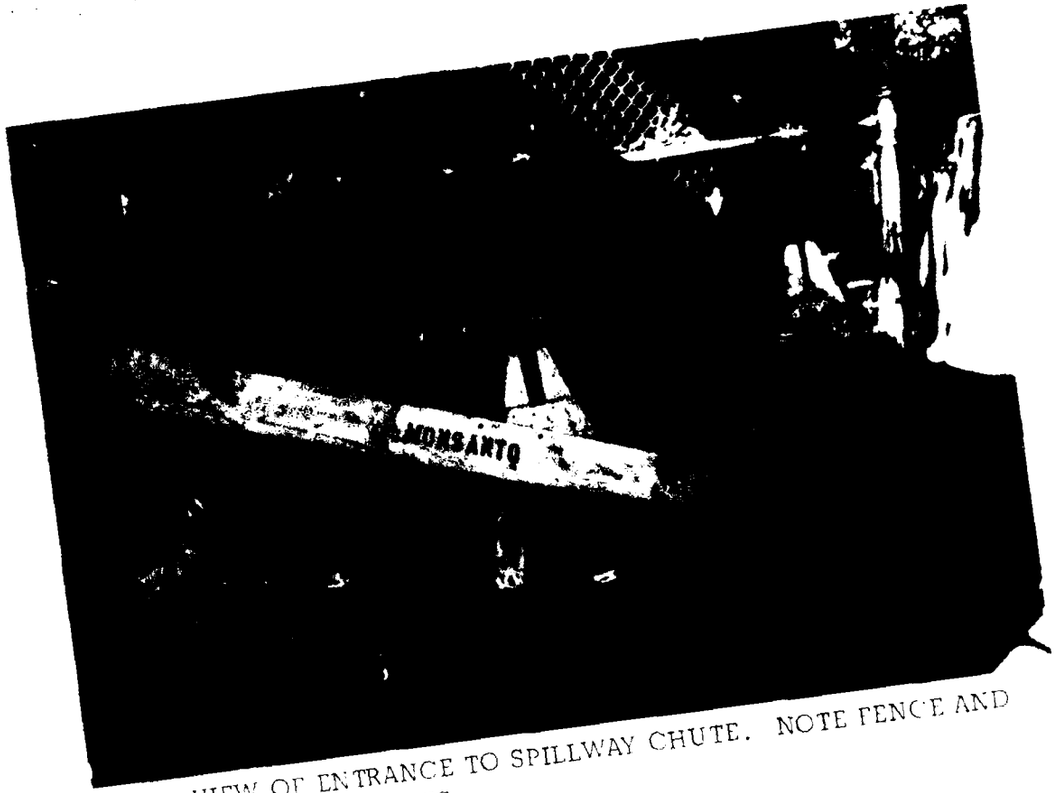
[illegible] TO KING EAST. NOTE EXTREMELY [illegible]



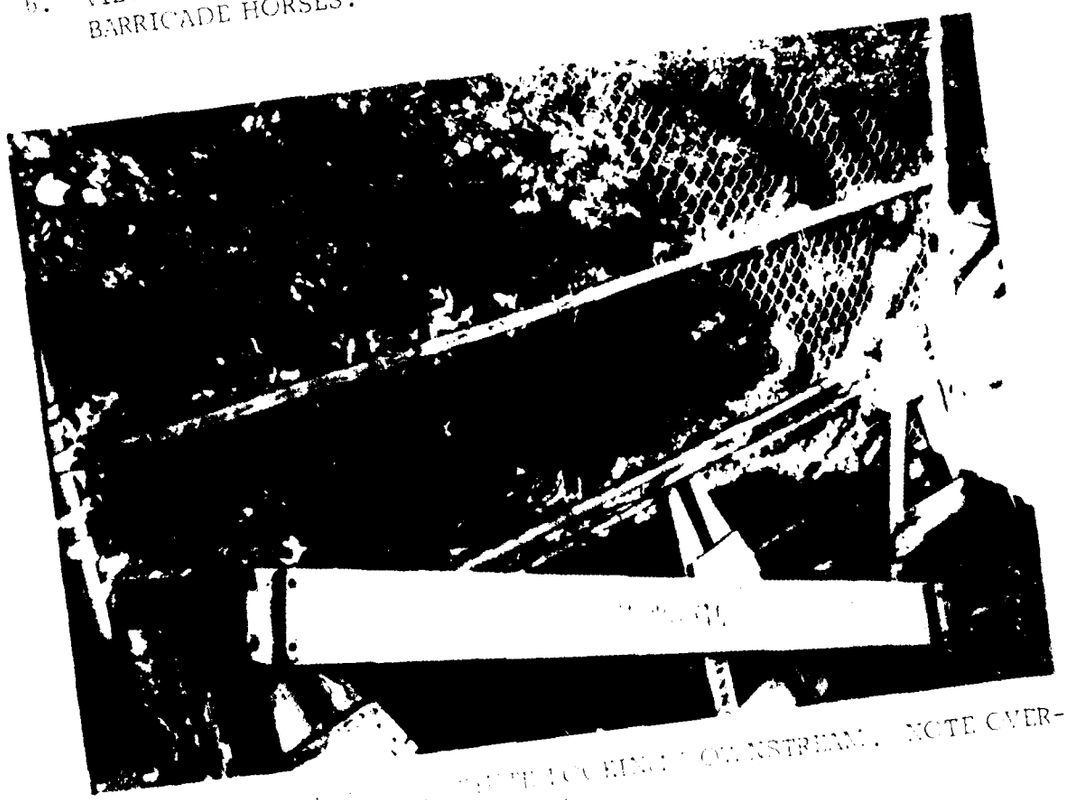
4. VIEW OF SPILLWAY ENTRANCE. NOTE VEGETATION.



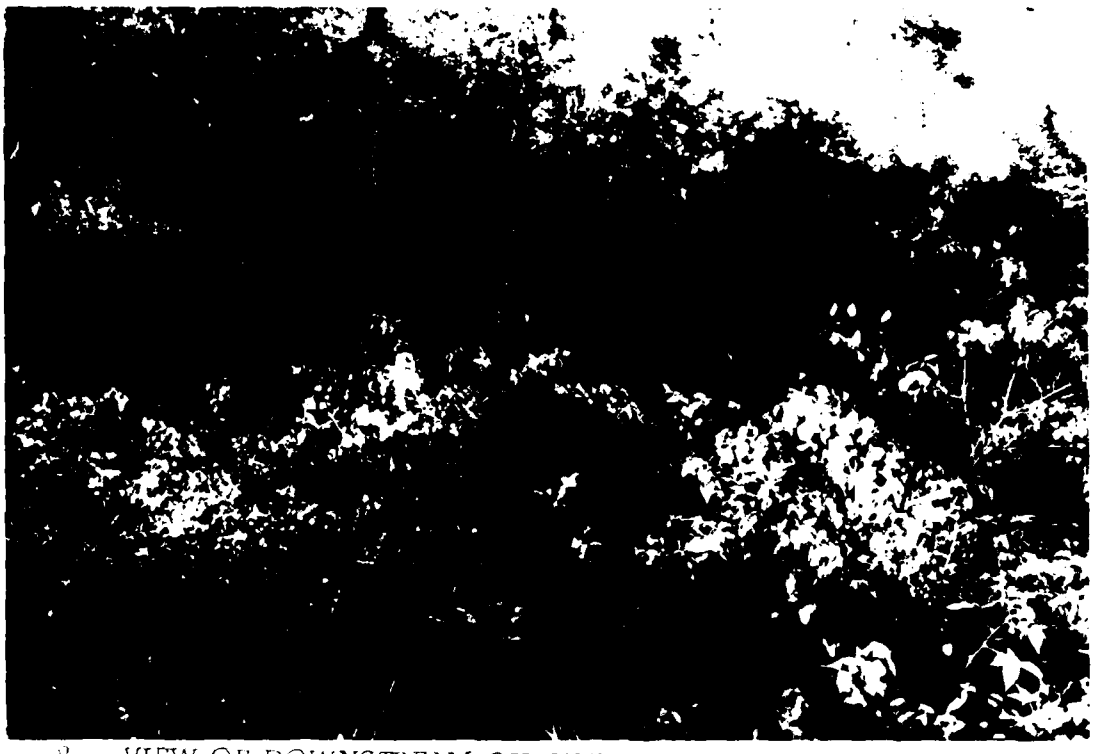
[illegible] CONDITION [illegible] BRIDGE.



6. VIEW OF ENTRANCE TO SPILLWAY CHUTE. NOTE FENCE AND BARRICADE HORSES.



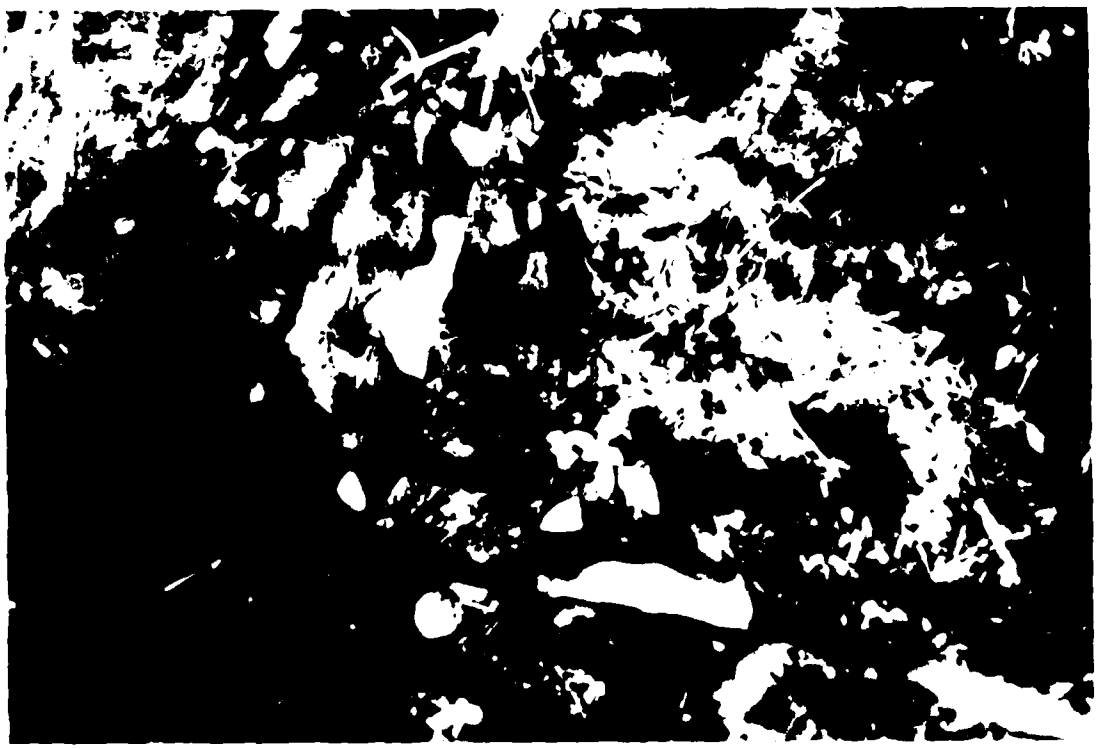
[illegible] TO BINGO OUTSTREAM. NOTE OVER-



8. VIEW OF DOWNSTREAM CHANNEL. NOTE EXTREMELY HEAVY VEGETAL GROWTH.

9. VIEW OF DOWNSTREAM TOWARD TO CKING WEST. NOTE EXTREMELY [illegible]

10. VIEW OF DEPRESSION ADJACENT TO MANHOLE LOCATED ON CREST.



11. [illegible] AREA [illegible] CONTACT.

HYDROLOGICAL DATA AND COMPUTATIONS


N

TAMS

Job No. [illegible]
Project [illegible] CHEMICAL CO [illegible]
Subject

Sheet 1 of
Date 100378
By [illegible]
Ch'k. by

LAND AREA 576 ACRES → 0.90
LAKE 6

TOTAL AREA 582 → [illegible]

[illegible] → [illegible]

ASSUME NORMAL POOL LEVEL [illegible] BELOW
EMERGENCY SPILLWAY CRITICAL LEVEL

[illegible] − 154 = 71

$T_c = [illegible] = \left[\frac{11.9(0.95)}{71}\right]^{0.385} = .4744 \rightarrow 28.4$ MIN.

[illegible] = 5 MIN

$t = \frac{L}{[illegible]} + 1.6\,T_c$ [illegible] = [illegible] − 1.326 → 14.6 MIN

$Q = \frac{484\,CIA}{T_c} = \frac{484\,[illegible]\,(.90)}{1.326} = 1336$ CFS

$T_c = 2.67\,T_c$ [illegible] → [illegible]

336

$\frac{.9967 \times 3 \times 60 \times 12}{43560 \times 576} =$ [illegible]

TIME (MIN)	Q (CFS)
[illegible]	0
[illegible]	[illegible]
10	40
[illegible]	50
[illegible]	333
[illegible]	[illegible]
[illegible]	336
[illegible]	[illegible]
[illegible]	400
[illegible]	[illegible]
[illegible]	50
[illegible]	70
[illegible]	45
[illegible]	20
[illegible]	[illegible]

Q = [illegible]

TIME (MINUTES)

TAMS

Job No. 1497-12
Project MONSANTO CHEMICAL CO LAKE
Subject (WHO PRT DISTR CONSTANT LOSSES)

Sheet 2 of
Date 10 03 78
By CV
Ch'k. by

LAKE IS LOCATED IN ZONE 1

6-HR PMP = 23.5 INCHES FOR AREA OF 10 SQ MILES

ADJUSTMENT (AREA SHAPE TO CONFORM WITH GENERALIZED ISOHYETAL PATTERN) 20% *

ADJUSTED 6-HR PMP : 23.5 (0.20) = 18.8 INCHES

ASSUMED LOSS AT 0.2 IN/HR 1.2 "

RAINFALL EXCESS 17.6 "

* EC 2-2-27

3

5

6

7

TAMS

Job No 1247-2

Project MONSANTO CHEMICAL CO LAKE

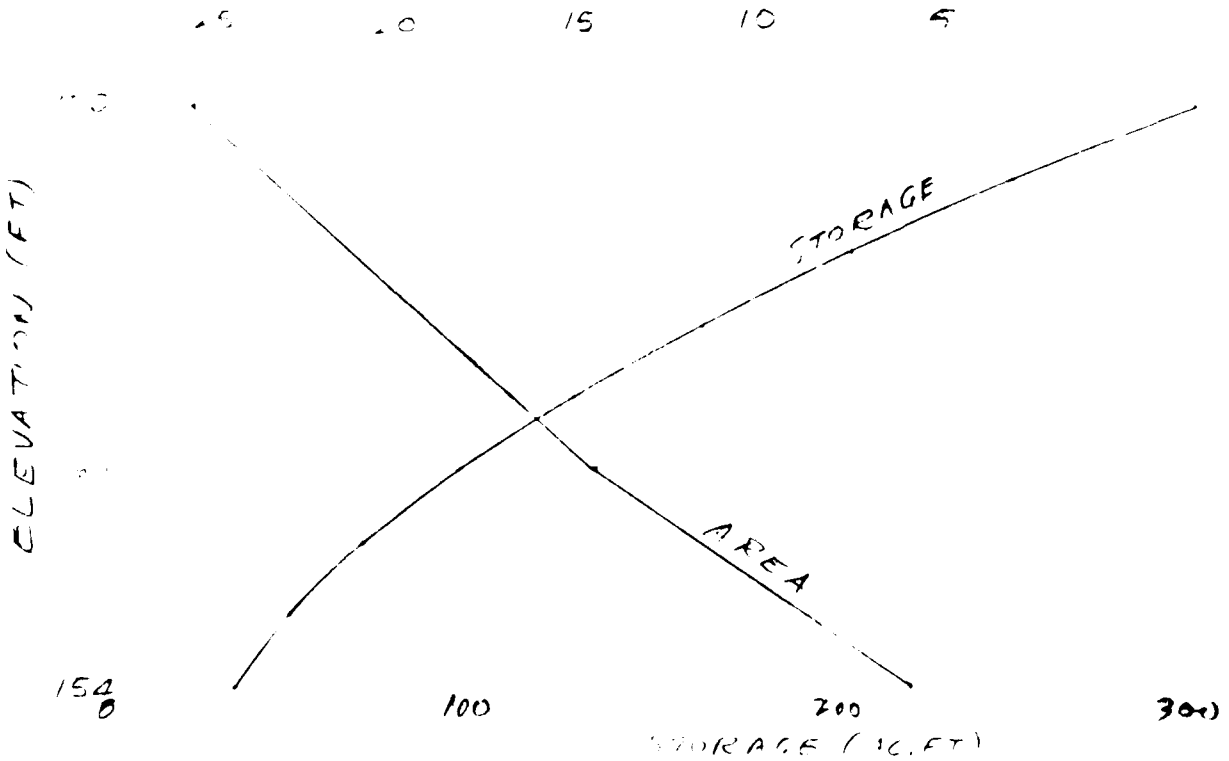
Subject

Sheet 8 of

Date 100378

By CV

Ch'k. by



E.	A(AC)	ΔV(AF)	V(AF)
154	6.0		33.9
156	8.9	14.9	48.8
158	11.8	20.7	69.5
160	14.7	26.5	96.0 *
162	16.9	31.6	127.6
164	19.1	36.0	163.6
166	21.3	40.4	204.0
168	23.5	44.8	248.8
170	25.7	49.2	298.0

* MAXIMUM IMPOUNDMENT - INVENTORY OF DAMS IN THE USA

TAMS

Job No. 1197-12

Project MONSANTO CHEMICAL CO LAKE

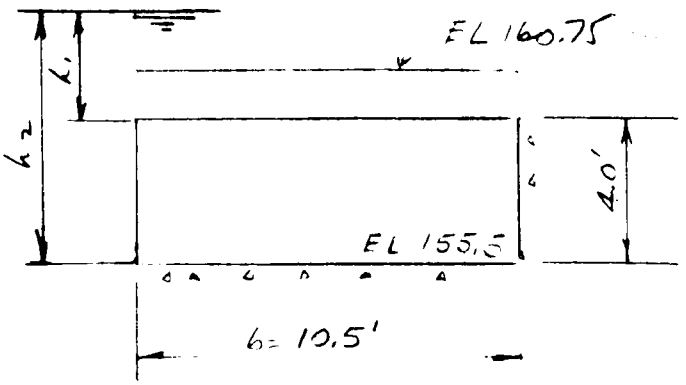
Subject

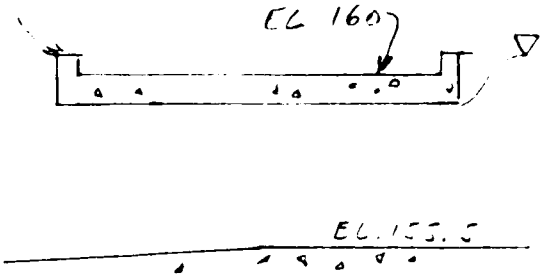
Sheet 9 of

Date 100378

By CV

Ch'k. by





$$Q = 6\, D_c^{3/2} \sqrt{g} = 59.58\, L^{3/2}$$

EL	D_c	Q	U	$1.25\, U^2/2g$	EL
155.5	0	0			
156	0.5	21.1	4.02	.31	156.31
157	1.5	109.5	6.95	.94	157.94
158	2.5	235.5	8.97	1.56	159.56
159	3.5	390.1	10.61	2.1[illegible]	161.19

ORIFICE FLOW

$$Q = \tfrac{2}{3} - \sqrt{2g}\,(h_2^{3/2} - h_1^{3/2})$$

EL	h_2	h_1	Q
160.[illegible]	4.5	[illegible].5	516.4

FLOW OVER DAM

EL	–	ΔA	A	$\sqrt{2gH}$	C	Q
160	[illegible]					
[illegible]	222.9	26.2	[illegible]	[illegible]	[illegible]	575
[illegible]	246.8*	234.8	4[illegible]1.0	[illegible]	[illegible]	339
[illegible]	[illegible]3.6	520.4	[illegible]	3.55	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]4.0	545.4	[illegible]		[illegible]17
168	[illegible]	407.6	2[illegible]3.0	[illegible]		[illegible]
170	[illegible]	[illegible]	2654.2	[illegible]	[illegible]	

* INCLUDES [illegible] BRIDGE

TAMS

Job No. 1487-2
Project MONSANTO CHEMICAL CO LAKE
Subject
Sheet 10 of
Date 10 03 78
By C.V.
Ch'k. by

SERVICE SPILLWAY CAPACITY CONTROLLED BY THAT OF THE 15-INCH CONC. OUTLET PIPE. ASSUME UNIFORM DIAMETER; L = 110 FEET LEVEL AT INV EL 142

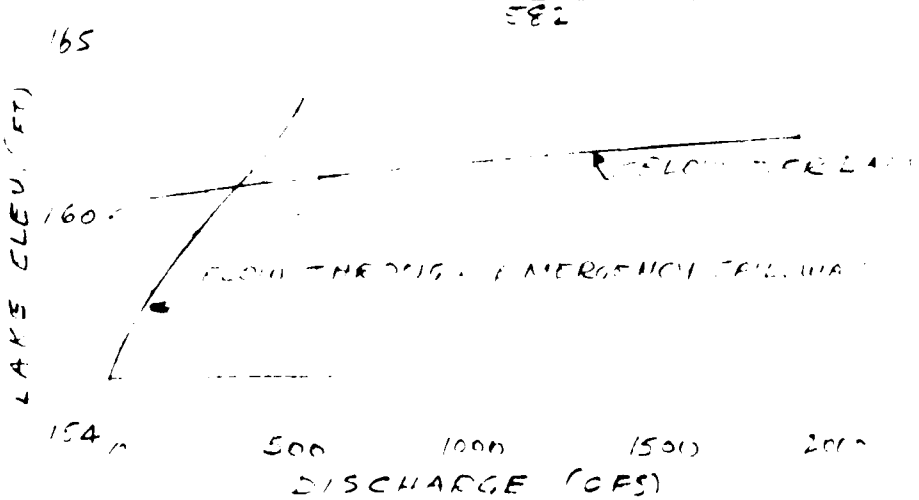
EL	H = (154 - 142 + 1.85(1.25))	Q
154	10.94	18.5 cfs

CHECK PIPE CAPACITY IN ROUTING TEST FLOOD

EL	Q_{SP}	Q_{DAM}	Q (CFS) TOTAL	H (FEET)
154	0		0	33.90
155.50	0		0	45.08
156.31	21.1		21.1	52.01
157.74	109.5		109.5	68.88
159.56	235.5		235.5	[illegible]
160	275	0	275.0	[illegible]
161	365	575	940.0	[illegible]
162	[460]	1888	1888.0	[illegible]
[illegible]		3655	3655.0	163.60
[illegible]		10817	10817.0	204.00
[illegible]		17299	17299.0	248.00

DISCHARGE H 94.00 - 33.90 = [illegible]

$$\frac{21.1 \times 12}{582} = [illegible]'' \text{ R.D.}$$



TAMS

Job No. 1197-12

Project MONSANTO CHEMICAL CO LAKE

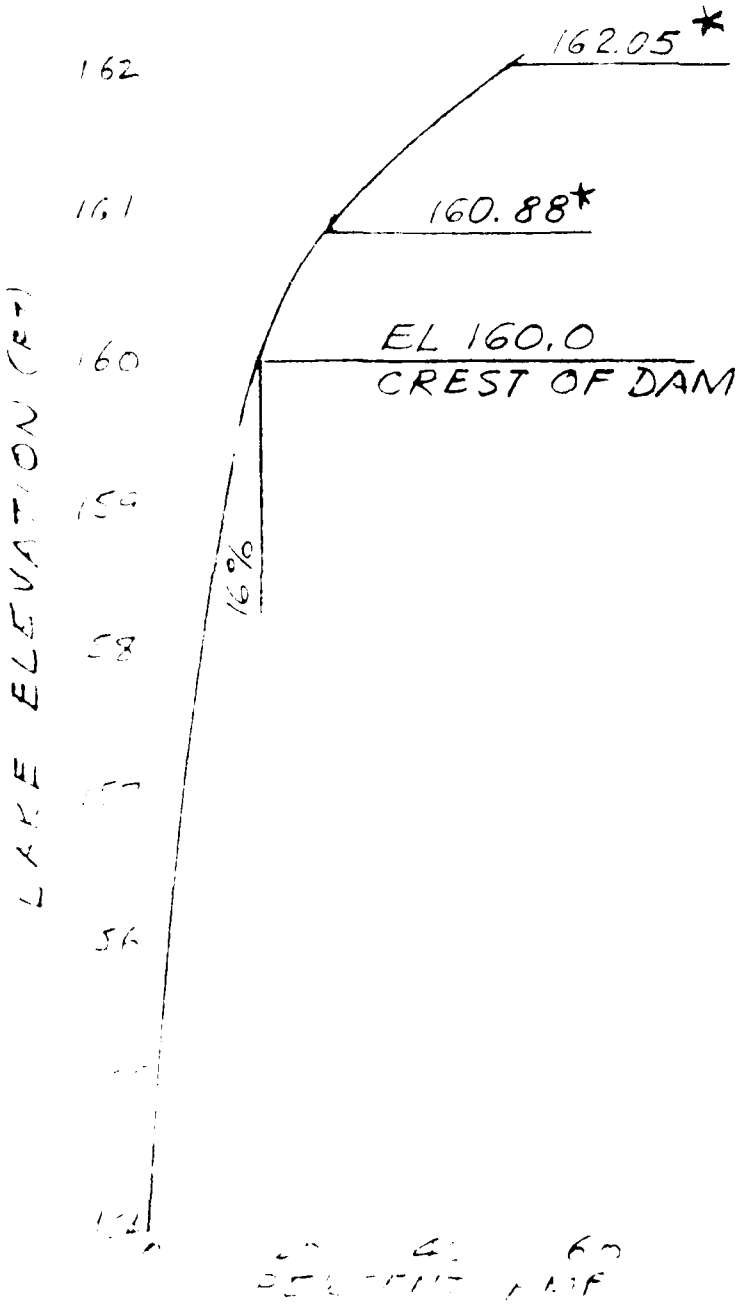
Subject

Sheet 15 of

Date 100578

By C V

Ch'k. by



* ELEVATIONS DETERMINED BY FLOOD ROUTING

APPENDIX E

INFORMATION AVAILABLE IN THE NATIONAL INVENTORY SYSTEM

INVENTORY OF DAMS IN THE UNITED STATES

STATE	ENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST	STATE	COUNTY	CONGR DIST	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
MA	575	NED	MA	013					MONSANTO COMPANY UPPER DAM	4209.1	7231.4	24	OCT	79

POPULAR NAME	NAME OF IMPOUNDMENT
	PLASTIC PARK POND

HYDROLOGIC REGION	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI)	POPULATION
01	TR CHICOPEE RIVER	SPRINGFIELD	0	164000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUC HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
RECTPG	1900	R	12	12	96	34	NED	N	N	N	N	13DEC78

REMARKS

14 COMMON NAME 22 APPROXIMATE

U S HAS	SPILLWAY CREST (FT)	TYPE	WIDTH (FT)	MAXIMUM DISCHARGE (FT)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
2	145	U	11	465												

OWNER	ENGINEERING BY	CONSTRUCTION BY
MONSANTO COMPANY		

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
TIPPETS-ABBETT-MCCARTHY-STRATTON	19	FEB	76	CHAP 253 MASS GENERAL LAWS

REMARKS

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254	12. REPORT DATE / 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

END

FILMED

8-85

DTIC